CLAIMS:

1. An apparatus for plasma treatment of a substrate surface comprising:

a plasma source for generating a plasma,

a plasma-control electrode, and

a drive means for effecting a relative movement between the plasma-control electrode and the plasma source,

wherein in use the plasma-control electrode is located adjacent the substrate to facilitate treatment of the substrate surface in a controlled manner.

2. The apparatus as claimed in claim 1 wherein the drive means also effects in use a relative movement between the substrate and the plasma source.

3. The apparatus as claimed in claim 1 or 2 wherein the plasma-control electrode and the substrate have substantially the same size.

4. The apparatus as claimed in any one of the preceding claims wherein the substrate and the plasma-control electrode are stationary and the plasma source is driven to effect the relative movement.

5. The apparatus as claimed in any one of claims 1 to 3 wherein the plasma source is stationary and in use both the substrate and the plasma-control electrode are driven.

6. The apparatus as claimed in any one of claims 1 to 3 wherein the plasma source is driven and both the substrate and the plasma-control electrode are in use driven

relative to the driven plasma source.

7. The apparatus as claimed in claim 6 wherein the plasma-control electrode and the substrate are in use rotated and the plasma source is in use scanning.

8. An apparatus for plasma treatment of a substrate *surface comprising:*

a plasma source for generating a plasma,

a plasma-control electrode, and

a drive means for effecting a relative movement of the plasma-control electrode and the plasma source relative to the substrate,

wherein in use the plasma-control electrode is located adjacent the substrate to facilitate treatment of the substrate surface in a controlled manner.

9. The apparatus as claimed in claim 8 wherein the plasma source and the plasma-control electrode are stationary and the substrate is in use driven to effect the relative movement.

10. The apparatus as claimed in claim 8 wherein the substrate is in use stationary and the plasma source and the plasma-control electrode are driven.

11. The apparatus as claimed in claim 10 wherein the plasma source and the plasma-control electrode are driven in a synchronised manner.

12. The apparatus as claimed in claim 8 wherein the substrate is in use driven and both the plasma-control electrode and the plasma source are driven relative to the

driven substrate.

13. The apparatus as claimed in claim 12 wherein the substrate in use is rotated and both the plasma-control electrode and the plasma source are in use be scanning.

14. The apparatus as claimed in any one of the preceding claims wherein the plasma-control electrode is arranged for facilitating the controlled surface treatment by controlling an energy distribution of the plasma in the proximity of the surface.

15. The apparatus as claimed in any one of the preceding claims wherein the plasma-control electrode is arranged to control an energy of plasma ions impacting on the substrate.

16. The apparatus as claimed in any one of the preceding claims wherein the surface treatment is facilitated so that in use the surface is treated in a controlled and non-uniform manner.

17. The apparatus as claimed in claim 16 arranged for coating the surface in a manner so that the coating has at least one of a non-uniform thickness, density and refractive index.

18. The apparatus as claimed in claim 17 wherein the thickness, density and refractive index are tapered along a length of the substrate.

19. The apparatus as claimed in any one of claims 1 to 15 wherein the surface treatment is facilitated so that in

use the surface is treated in a controlled and uniform manner.

20. The apparatus as claimed in claim 19 arranged for coating the surface in a manner so that the coating has at least one of a uniform thickness, density and refractive index.

21. The apparatus as claimed in any one of the preceding claims wherein the plasma-control electrode is positioned so that the substrate is located between the plasma source and the plasma-control electrode.

22. The apparatus as claimed in any one of the preceding claims wherein the substrate is positioned on the plasma-control electrode.

23. The apparatus as claimed in any one of the preceding claims wherein the plasma-control electrode comprises apertures.

24. The apparatus as claimed in any one of the preceding claims wherein the plasma control electrode is a mesh.

25. The apparatus as claimed in claim 24 wherein the mesh is positioned between the plasma source and the substrate.

26. The apparatus as claimed in any one of the preceding claims arranged so that the controlled treatment of the surface is facilitated by controlling a velocity of the relative movement and whereby a local plasma treatment time per unit substrate area can be controlled.

27. The apparatus as claimed in any one of the preceding claims comprising a guard wall that confines the plasma.

28. The apparatus as claimed in claim 27 wherein the guard wall is positioned about the plasma source.

29. The apparatus as claimed in claim 27 wherein the guard wall surrounds the plasma source.

30. The apparatus as claimed in any one of claims 27 to 29 wherein the guard wall is also arranged to control a flow of gas.

31. The apparatus as claimed in any one of claims 27 to 30 wherein the guard wall comprises an electrically conductive material and a voltage potential is in use applied to the guard wall to further control properties of the plasma.

32. The apparatus as claimed in any one of claims 27 to 31 wherein the guard wall in use confines the plasma to a main plasma region and reduces plasma formation outside the main plasma area.

33. The apparatus as claimed in any one of claims 27 to 32 wherein the guard wall is positioned so that in use a gap is formed between the substrate and the guard wall.

34. The apparatus as claimed in claim 33 wherein the guard wall is arranged for pumping a gas through the gap and towards the source electrode.

35. The apparatus as claimed in claim 34 wherein a

reactive gas is in use pumped through the source with its exhaust affected by the gas pumped through the gap.

36. The apparatus as claimed in any one of the preceding claims wherein the plasma source comprises a number of spaced apart gas outlets.

37. The apparatus as claimed in any one of the preceding claims further comprising a monitoring system that is arranged to monitor the plasma treated substrate.

38. The apparatus as claimed in claim 37 wherein the monitoring system is an optical system and is arranged to irradiate the substrate with a broadband optical wavelength spectrum and is also arranged to receive reflections from the plasma treated substrate.

39. The apparatus as claimed in claim 38 wherein the monitoring system and the relative movement are arranged so that the surface can be monitored during treatment but outside the plasma region to enable quasi real-time monitoring.

40. An apparatus for plasma treatment of a substrate surface comprising:

a plasma source for generating a plasma,

a drive means for effecting a relative movement of the substrate relative to the plasma source and

a guard wall positioned about the plasma source to confine the plasma,

wherein in use the relative movement effects treatment of the substrate in a predetermined manner and the guard wall confines the plasma.

41. The apparatus as claimed in claim 40 wherein the guard wall is positioned about the plasma source.

42. The apparatus as claimed in claim 41 wherein the guard wall surrounds the plasma source.

43. The apparatus as claimed in any one of claims 40 to 42 wherein the guard wall is also arranged to confine a flow of gas.

44. The apparatus as claimed in any one of claims 40 to 43 wherein the guard wall comprises an electrically conductive material and a voltage potential is in use applied to the guard wall to further control properties of the plasma.

45. The apparatus as claimed in any one of claims 40 to 44 wherein the guard wall is positioned so that in use a gap is formed between the substrate and the guard wall.

46. The apparatus as claimed in claim 45 wherein the guard wall is arranged for pumping a gas through the gap and towards the source electrode.

47. A substrate that is plasma treated by the apparatus claimed in any one of the preceding claims.